



The West Valley Demonstration Project

EXECUTIVE SUMMARY

Project Description

The West Valley Demonstration Project (WVDP), the site of a U.S. Department of Energy environmental cleanup activity operated by West Valley Nuclear Services Co., Inc. (WVNS), is in the process of stabilizing liquid high-level radioactive waste remaining at the site after commercial nuclear fuel reprocessing had been discontinued. The Project is located in Western New York State, about 30 miles south of Buffalo, within the New York State-owned Western New York Nuclear Service Center (WNYNSC). The WVDP's central mission is to stabilize the liquid high-level waste, now stored in underground tanks, in containers suitable for temporary storage on-site and for eventual transport to a federal repository. In 1997 the Project successfully continued vitrification of high-level radioactive waste into a durable, solid glass form.

Compliance

Management at the WVDP continued to provide strong support for environmental compliance issues in 1997. DOE Orders and applicable state and federal statutes and regulations are integrated into the Project's compliance program. Highlights of the 1997 compliance program were as follows:

- Inspections of hazardous waste activities by the New York State Department of Environmental Conservation (NYSDEC) verified Project compliance with the regulations.
- The Project continued to identify and evaluate specific waste management areas at the site in order to comply with the Resource Conservation and Recovery Act (RCRA) 3008(h) Administrative Order on Consent.
- The Project also met the requirements of the Emergency Planning and Community Right to Know Act (EPCRA) by identifying and making available to the local community information about hazardous materials used at the Project. All EPCRA reporting deadlines were met ahead of schedule in 1997.
- The State Pollutant Discharge Elimination System (SPDES) permit currently identifies four permitted liquid outfalls at the Project. A draft

A reader opinion survey has been inserted in this report. If it is missing, please contact Community Relations at (716) 942-4610. Additional Project information is available on the Internet at <http://www.wvdp.com>.

SPDES permit to monitor eleven identified storm water outfalls was issued for public comment in June 1997.

- In 1997 SPDES permit limits were exceeded three times during temporary process upsets. Natural variations in a nonprocess groundwater outfall caused two additional exceedances.
- No notices of violation from any environmental regulatory agencies were received in 1997, although a warning letter was received from NYSDEC regarding the five SPDES exceedances.
- Among other pollution prevention accomplishments, waste minimization goals for 1997 were exceeded in all of the waste categories set in the goals statement.
- In accordance with the Site Treatment Plan developed under the Federal Facility Compliance Act, all calendar year 1997 milestones for the characterization, treatment, and disposition of radioactive mixed waste at the WVDP were completed.
- Although two minor liquid spills occurred on-site inside a previously contaminated facility area, there were no accidental off-site releases of radiological material in 1997.

Environmental Monitoring Program

Throughout the first year of vitrification, specific, sustained attention was given to environmental monitoring and assessment of effluents from site facilities. During 1997 Project environmental scientists continued to sample and measure effluent air and water, groundwater, surface streams, soil, sediment, vegetation, meat, milk, and game animals, and to record environmental radiation mea-

surements. More than 11,000 samples were collected in order to assess the effect of site activities on public health, safety, and the environment.

The Project environmental monitoring network is continually being evaluated and updated to ensure that all locations and sample types that would be sensitive to process-related changes are monitored. Once samples are collected, they are tested for radioactivity or nonradioactive substances using approved laboratory procedures. Both the laboratory test results and direct measurement data are reviewed at several stages for quality and for comparison with similar data. Environmental monitoring results are kept up-to-date in a controlled computer database available to WVDP scientists, who assess the data and evaluate trends at key locations.

Air Monitoring

WVDP airborne radiological emissions in 1997 included six routinely operated permitted exhaust stacks and five exhausts excluded from permitting because of their low emission potential. As anticipated, radioactive releases from the Project in 1997 were far below the most restrictive limits that ensure public health and safety. Operation of the vitrification process resulted in radiological air releases similar to those noted in the last few months of 1996. The dose from 1997 air emissions was about 0.5% of the most restrictive limit. In 1996 the dose from these emissions was about 0.09%.

Although several fission products contribute to the radioactivity, the most significant continued to be airborne iodine-129, a long-lived radionuclide that exists in gaseous form at the high temperatures of the vitrification process and that is not fully removed during treatment of the air effluent. The 1997 levels of gaseous iodine-129 emissions increased approximately six times from 1996 levels but, in perspective, total radionuclide emissions remained less than 1% of the EPA radionuclide emissions standard of 10 millirem (mrem)

per year effective dose equivalent to the maximally exposed off-site individual. Approximately 99% of the 1997 calculated dose to the public is attributable to iodine-129 emissions from the vitrification process.

Six air samplers on the perimeter of the WNYNSC and four in more distant locations continuously collect samples of air at the average human breathing height. The samples are tested for radioactivity carried by airborne particles. At two of the ten locations test samples are collected for analysis of tritium and iodine-129. Gross radioactivity (airborne particulate) in air samples from around the perimeter was no different than radioactivity measured in remote background locations or nearby communities. Gross radioactivity at the nearest perimeter sampler remained the same in 1997 as in 1996. Concentrations in samples from two on-site ambient air samplers located near waste storage facilities operated during 1997 also were indistinguishable from background levels.

Nonradiological air emission monitoring of nitrogen oxides, a byproduct of the vitrification process, is conducted as part of the emission-control process. Although there are a number of permitted air emissions sources at the Project, none release a sufficient quantity of nonradiological material to warrant continuous monitoring as a condition of a regulatory permit.

Surface Water Monitoring

The largest single source of radioactivity released to surface waters from the Project is the discharge from the low-level waste treatment facility through the lagoon 3 release outfall. The treated effluent water flows into Erdman Brook, which joins Frank's Creek just before exiting the Project's fenced area. Six treated batches totaling 11.6 million gallons were released over a combined thirty-nine day period in 1997. In 1996, 13.4 million gallons had been released.

The combined average concentration of all radionuclides in liquid releases in 1997 was approximately 22% of the DOE derived concentration guide (DCG) used to evaluate liquid process discharges. (See *Chapter 1, Environmental Monitoring Program Information* [p.1-5] for an explanation of derived concentration guides.) The average radioactivity concentrations from 1994 to 1996 were 44%, 43%, and 35% of the DCG, respectively. The reduction from 44% to 22% over this period is mostly attributable to steadily decreasing strontium-90 concentrations. The other major contributor to the total combined DCG is uranium-232, which averaged 11.9% of its DCG in 1997, 9% lower than the average concentration in 1996.

Surface water is continually sampled on the Project premises by four automatic samplers. Time-composite samples are collected at Frank's Creek where it exits the Project and at two other on-site points where drainage flows off-site. Another automatic sampler is located at a drainage point near the former radioactive waste disposal areas. Samples also are collected periodically at nine other points of drainage from facility areas. The data from these samples are used to determine the type, amount, and probable origin of both radiological and nonradiological contaminants.

As in 1996, the most notable source of gross beta and strontium-90 radioactivity in surface water in 1997 was from groundwater flowing beneath the north plateau and emerging in a seep to join the surface water drainage from the north plateau into Frank's Creek and then off-site. In 1997 the strontium-90 concentration, which originates from pre-Project operations, was about 1.1 times the DCG for liquid discharges. The 1996 strontium-90 concentration at this point was 1.3 times the DCG.

This drainage point has been carefully monitored since the contaminated seep was identified in 1993. Currently, a groundwater recovery and

treatment system is being used to reduce the seepage of strontium-90 to surface water on the north plateau. The decrease in the 1997 strontium-90 concentration at the northeast swamp drainage, relative to the 1996 concentration, indicates that the system has favorably influenced a downward trend.

Soil and Stream Sediments

Surface soil is collected annually at the ten air sampler locations to track long-term deposition. Sediments from off-site creeks are collected annually from three downstream and two upstream locations. Three on-site drainage areas are also sampled annually to track waterborne movement of contaminants.

Surface soil samples in 1997 showed little change from previous years. For the most part, except for one area that historically shows average cesium-137 concentrations above background values, the concentrations of radionuclides normally present in both worldwide fallout and in Project air emissions are no different at near-site locations than at background locations. Because of pre-Project releases from nuclear fuel reprocessing activities, the concentrations of radioactivity in downstream creek sediments historically are above concentrations in the upstream sediments. However, the twelve-year graphs indicate no upward trends at either upstream or downstream points. No changes were noted in on-site soil/sediment samples between 1997 and previous years.

Groundwater Monitoring

Scheduled groundwater samples were collected from sixty-five on-site locations in 1997. Based on an evaluation of results from the 1996 program, the location, frequency of sampling, types of testing, and method of sample collection were adjusted for the 1997 monitoring program. Computerized screening of 1997 data speeded identi-

fication and evaluation of changes. Monitoring activities in 1997 included gathering more detailed information about the north plateau strontium-90 contamination. The 1997 groundwater program confirmed that strontium-90 is still the major contributor to elevated gross beta contamination in the plume on the north plateau. The concentrations of other isotopes were below the DCG levels generally applied to surface water. In addition to collecting samples from wells, groundwater was routinely collected from seeps on the side of the bank above Frank's Creek. Results were similar to 1996 results.

As in previous years, near-site residential water supply wells sampled during 1997 indicated no radioactive contamination.

Vegetation, Meat, and Milk

Test results from beans and sweet corn showed no difference between annual samples collected near the site and samples taken from remote locations. A single hay sample showed a strontium-90 result nine times higher than its control location, but this increase was not corroborated by other sample types collected nearby. Apples collected from a near-site tree showed strontium-90 at levels statistically above 1997 background values. Strontium-90 values slightly above background were reported in most of the near-site fruit and vegetables, but corresponding above-background levels of other radionuclides were not found. In 1997, as in previous years, very little differences in radioactivity concentrations were observed between samples of beef and milk from near-site and remote locations.

Game Animals

Fifty fish specimens from Cattaraugus Creek were collected in 1997 for testing. Ten of these were from below the Springville dam, including species that migrate up from Lake Erie. Two semian-

nual sample sets of ten fish each were collected downstream of Buttermilk Creek, which receives Project liquid effluents, and two sets were collected upstream. These samples represent sportfishing species and bottom-feeding indicator species. Testing for gamma-emitting isotopes and strontium-90 showed levels very similar to those in 1996 samples. Concentrations in downstream and upstream specimens of the same species were similar. One of the ten below-dam fish, a migrating steelhead, did have detectable strontium-90 above background levels.

Three samples of whitetail deer venison from an on-site (WNYNSC) herd were tested for gamma-emitting isotopes and strontium-90. Two of three on-site venison samples contained tritium and cesium-137 concentrations above background concentrations. One person eating 100 pounds of meat from on-site deer would receive 0.46 millirem (mrem), which is 200 times less than the DOE 100 mrem dose standard. In comparison to an equal number of samples from deer taken in areas remote from the Project, the values for strontium-90 and other gamma-emitting isotopes were similar. Special samples were collected from an on-site herd of deer that was moved from inside the facility fence. Calculation of cesium-137 concentrations indicated that there will be no detectable differences from background concentrations in this herd in the fall of 1998, during deer hunting season.

In 1997, the fourth year of public access to portions of the WNYNSC for deer hunting, 113 deer were taken by hunters during the hunting season.

Program Quality

The WVDP environmental program is designed to produce high quality, reliable results. To maintain this standard, each scientist must give continuous attention to the details of sample handling, following approved collection and analysis procedures and data review. In addition to a for-

mal self-assessment review just before vitrification start-up, the WVDP environmental laboratory also continued the practice of analyzing radiological crosscheck samples sent from a national laboratory. Of 169 radiological analyses performed at both the on-site Project laboratory and off-site commercial service laboratories, 98.8% were within the control limits. Of the forty-seven samples tested on-site at the Project environmental laboratory, 100% were within acceptable limits, and twenty-two of the twenty-three nonradiological check samples tested at an off-site laboratory were within acceptable limits.

Although no formal external audits of the environmental program were conducted in 1997, test results from the crosscheck program and from co-located sample measurements taken by independent agencies such as the Nuclear Regulatory Commission (NRC) and the New York State Department of Health (NYSDOH) indicate that high quality standards are being met. The WVNS Environmental Affairs and the WVNS Quality Assurance departments periodically conducted and documented informal reviews of program activities in 1997.

Notable 1997 Events

The central event during 1997 was continued successful operation of the WVDP vitrification facility. Operational tracking of various effluents occupied most of the year. Removal of the resident deer herd from inside the security-fenced area was successfully planned and carried out.

Dose Assessment

There were no events affecting public health and safety or the environment associated with Project operations in 1997. The small amounts of radioactive materials that were released were assessed and doses were calculated using approved computer modeling codes. These evaluations in-

cluded calculations of doses received from the consumption of game animals and locally grown food. Airborne doses were calculated using CAP88-PC, an EPA-approved computer code. The result was a maximum dose to an off-site individual of 0.05 millirem (mrem). The limit is 10 mrem. Doses from the liquid pathway to the maximally exposed person were estimated to be 0.012 mrem from Project effluents (excluding north plateau drainage). The north plateau drainage contribution to the total liquid dose was estimated to be an additional 0.012 mrem. The predicted dose from all pathways was less than 0.075 mrem, or 0.075 % of the 100-mrem DOE limit.

Conclusion

The West Valley Demonstration Project conducts extensive monitoring of on-site facilities and the surrounding environment. This program fulfills federal and state requirements to assess the effect of Project activities on public health and safety and the environment. In addition to demonstrating compliance with environmental regulations and directives, evaluation of data collected in 1997 indicates that Project activities pose no threat to public health, safety, or the environment.